Chapter 12. Sacramento-San Joaquin Delta Region

Setting

Until 1850, the Delta was wild, a tidal marsh with islands and river channels that changed according to nature's will. By the 1870s, settlers had built levees and turned marshland into farmland. Farming on a commercial scale became a way of life. The 1870s and 1880s saw arrival of commercial fisheries that introduced non-native species—striped bass and American shad. In the same era, commerce grew, and with the vessels transporting goods to market came invasive species unintentionally carried to the Delta in the ballast water of these vessels. By 1951, with completion of the Delta-Mendota Canal, the Delta was forever changed. This federal project for moving water to California's Central Valley farms was the start of water supply infrastructure that would evolve to today's multi-billion dollar system. Now, this massive network of canals, weirs, pumps, and fish screens moves water to farms, industries, and residents hundreds of miles from the Delta. What was once a continually changing tidal marsh is now a complex maze of natural and man-made resources providing multiple benefits to California's water users and the economy. The challenge the region faces in the 21st century is how to sustain the viability of these resources while demand for them continues to grow.

Background

This profile of the Delta Region is an overview of current efforts to carry out actions that will allow the region to continue to serve society's demand for farm products, fishing, recreation, and water—all while protecting the Delta's ecosystem and water quality. The intent of the profile is to give readers a sense of the region's water resource management priorities and outline major efforts by CALFED and others to integrate water resource management activities in the Delta.

The California Bay-Delta Authority became a state agency in January 2003. The authority will oversee implementation of the CALFED Bay-Delta Program to improve water supplies in California and the health of the San Francisco Bay–Sacramento/San Joaquin River Delta.

The mission of the CALFED Bay-Delta Program is to develop and implement a long-term, comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system.

- The major water-related challenges facing the
- Delta are reflected in the CALFED Program
- priorities and issues for the Region:
- Preserve a viable agricultural base.
- Maintain strong levees.
- Protect water quality for agricultural and urban water users in and around the Delta.
- Protect and increase recreational opportunities.
- Restore healthy ecosystems to benefit native species.

These goals incorporate the four broad CALFED resource management objectives of water supply reliability, water quality, ecosystem restoration, and levee system integrity, and respond to concerns expressed by stakeholders and the Delta Protection Commission (DPC).

Authorized by the Delta Protection Act of 1992, the DPC is the regional entity charged with protecting the natural, agricultural, and recreational resources of the Delta. The Act required the DPC to develop and adopt a resource management plan for the *primary zone* of the Delta (defined in Public Resources Code Section 29728) The DPC's mission is to guide the protection of the Delta's unique natural quality, cultural viability, economic viability, and recreational opportunities using three main objectives:

The Delta Protection Commission was created by State Legislation in 1992 with the goal of developing regional policies for the Delta to protect and enhance the existing land uses in the 500,000 acre Primary Zone: agriculture, wildlife habitat and recreation. In 2000, the Commission was made a permanent State agency.

- Protection, maintenance, and enhancement and restoration of the overall quality of the Delta environment including agriculture, wildlife habitat, and recreational activities;
- Assurance of orderly, balanced conservation and development of Delta land resources; and
- Improvement of flood protection to ensure an increased level of public health and safety.

The CALFED Program and the DPC recognize that activities of the CALFED Ecosystem Restoration, Conveyance, Storage, and Levee System Integrity program elements must be in concert with the Delta Region's land use and recreation objectives. Therefore, CALFED and the DPC coordinate activities on a regular basis.

Geography and Climate

The Sacramento-San Joaquin Delta is a unique and valuable resource and an integral part of California's water system. Located at the confluence of the Sacramento and San Joaquin Rivers, the Delta is part of the largest estuary system on the West Coast and is the keystone to operation of the two largest water projects in California_the State Water Project and the federal Central Valley Project. The region extends from the confluence of the two rivers inland to Sacramento and Stockton and spans roughly 750,000 acres. A large part of this land is below sea level, and relies on more than 1,100 miles of levees for protection against flooding along the hundreds of miles of interlaced waterways.

The Delta boundary was first defined in 1959 with the passage of the Delta Protection Act. California Water Code Section 12220 contains the legal description of the Delta.

The Delta's network of waterways conveys runoff from over 40 percent of California's land area. Water from rivers of California's Great Central Valley flows to the Pacific Ocean through the Delta. Major tributaries include the Sacramento, San Joaquin, Calaveras, Cosumnes, and Mokelumne Rivers. These rivers plus their tributaries carry 47 percent of the State's total runoff.

Land Use

The vast majority of the Delta land is agricultural (about 538,000 acres). Because of the rich peat soils and the abundant supply of water, these acres are among the most highly productive land in the world. Principal crops grown include corn, grain, alfalfa, pasture, asparagus, tomatoes, fruit, nuts, and safflower. Open water covers about 60,000 acres, while urban and commercial property comprises approximately 64,000 acres. The remainder of the region presently consists of undeveloped natural plant vegetation.

Population

According to the census figures used in the 1995 Sacramento-San Joaquin Delta Atlas, the population in the Delta was an estimated 410,000 in 1990. The legal Delta encompasses portions of six counties: Alameda, Contra Costa, Sacramento, San Joaquin, Solano and Yolo. Current data from the California State Census Data Center for areas of these counties within the legal Delta indicate about 461,000 people reside in the Delta Region. (Figure 1 shows a map of current population estimates for each of the county areas within the legal Delta.) Rapid growth is occurring in urban areas in and surrounding the Delta, including West Sacramento, Sacramento, Elk Grove, Lathrop, Stockton, Tracy, Brentwood, Oakley, Discovery Bay, Mountain House, Antioch, Pittsburg, and Rio Vista.

Water Use

Water use in the Delta Region is mostly agricultural, with over 4,000 cubic feet per second of surface water diverted from Delta channels during peak summer months to irrigate crops. Currently there are roughly 1,800 sites where agricultural water is pumped onto the Delta islands, and the total volume of pumped water is about 1 million acre-feet annually. The main crops grown in the Delta are alfalfa, asparagus, corn, fruit, grain and hay, pasture, safflower, sugar beets and tomatoes. Most Delta farms use water taken directly from Delta sloughs and rivers under riparian water rights, and drainage water from the islands is pumped back into the Delta waterways. Small communities in the Delta primarily use groundwater wells for their water needs, and urban water use in the Delta only accounts for a small percentage of the total developed supply. The remaining portion of water in the Delta goes to wildlife habitat, salinity control, and other environmental uses. Recreation uses are also important in the Delta, with an estimated 12 million "user days"[1] recorded each year for recreation purposes.

Water Exported from the Delta

Water flowing through the Delta is the major source of fresh water inflow to the San Francisco Bay. The Delta also provides a portion of the water supply for many communities in the Bay region. Water exported southwards from the Delta provides drinking water for roughly two-thirds of the state's population (over 22 million people) and irrigation water for more than four million acres of farmland statewide. Larger diversions from the Delta include the State Water Project (Banks Pumping Plant and the North Bay Aqueduct), Central Valley Project (Tracey Pumping Plant), and Contra Costa Water District. Table 1 provides a water balance that summarizes the major water sources entering and leaving the Delta.

The boundaries of the Delta were legally defined by the Delta Protection Act of 1959 (California Water Code Section 12220) and it is composed of The Uplands Zone (lands above the five-foot elevation contour) and The Lowlands Zone (lands at or below the five-foot contour line). The statutory Delta

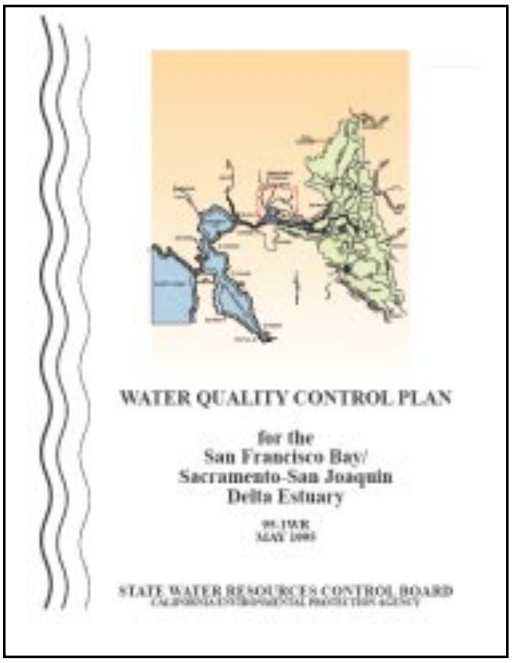
[1] A "user day" is a measure of the number of people visiting or using a site over part or all of a given day. Since some recreation users will visit recreation areas more than once each year, the total number of people using recreation facilities over a year in the Delta is less than 12 million.

Boundary that defines the Legal Delta is shown on the following map, along with actual water inflows, outflows, uses and exports for an average water year (2000).

Delta Water Standards

Requirements of the State Water Resource Control Board (SWRCB) govern release of upstream flows and curtailment of export pumping to maintain Delta water quality and the outflow requirements to the San Francisco Bay. The first water quality standards for the Delta were adopted in May 1967, when the State Water Rights Board (predecessor to the SWRCB) released Water Right Decision 1275, approving water rights for the State Water Project while setting agricultural salinity standards as terms and conditions. These requirements were altered in 1971 under Decision 1379 (D-1379), which added standards the CVP and SWP are to meet for non-consumptive uses (water dedicated to fish and wildlife), along with agricultural, municipal, and industrial consumptive use standards. In 1978, the SWRCB issued D-1485 and the 1978 Delta Plan, which together revised flow and salinity standards and required the US Bureau of Reclamation (USBR) and Department of Water Resources (DWR) to reduce pumping, release stored water upstream, or both to meet the standards.

In 1986, Congress passed the CVP-SWP Coordinated Operation Agreement (Title I of PL 99-546), which included requirements that the CVP be operated in coordination with the SWP to meet state water quality standards in the Delta. Also in 1986, the Supreme Court upheld the Racanelli Decision, which recognized SWRCB authority and discretion over water rights and water quality issues, including authority over CVP operations. As a result of increasing use of Delta waters combined with escalating environmental and fishery problems, the SWRCB adopted a new Bay-Delta Plan in 1991, which included objectives for salinity, dissolved oxygen, and temperature. The United States Environmental Protection Agency (EPA) followed with federal standards for the Estuary through EPA regulations in 1994. In December of 1999, the SWRCB issued a new Decision 1641 as a part of the1995 Bay-Delta Water Quality Control Plan, which replaced earlier Delta standards and conditioned the water rights permits of the SWP and CVP to implement the new objectives. The requirements set in D-1641 covered Phases 1 – 7 of the Bay-Delta Water Rights Hearings. In April of 2001, the SWRCB went on to adopt Water Rights Order 2001-05, which facilitates negotiations to settle the responsibilities for implementing and maintaining the 1995 WQCP.



Currently the SWP and the CVP coordinate project operations to maintain the standards established by D-1641, by releasing water from upstream reservoirs for Delta outflow requirements, and by curtailing export pumping at the SWP Banks and CVP Tracy Pumping Plants during the specified time periods. This combination of Delta outflow requirements and export pumping limitations impose the most difficult challenges to the process of transporting water from upstream reservoirs to meet water needs in the San Joaquin Valley and Southern California.

State of the Region

The complex resource issues of the Delta will continue to require extensive planning, coordination and management, so that all interests who benefit from the Delta can participate in the vast array of projects intended to improve water supply, water quality, ecosystem health, and levee stability. In the initial years of the CALFED Stage 1 program, CALFED activities in the Delta have focused on ecosystem restoration, levee stability, and drinking water quality. Efforts toward coordination and integration of multiple objectives are proceeding. Interest groups and government agencies are continuing to develop a package interdependent actions and programs that will protect the Delta's water quality and ecosystem, and keep the levee system stable. The California Bay-Delta Authority is working with the Delta Protection Commission to carry out actions and programs set forth in the CALFED Bay-Delta Program, a comprehensive plan for addressing ecosystem health and water supply reliability problems in the Bay-Delta. Currently, CALFED agencies are working on what's called the *Delta Improvements Package* under which technical knowledge gained from scientific and engineering studies is used to determine how best to sequence interrelated actions outlined in the CALFED plan. Among the many challenges of this effort is the issue of how to reconcile the engineering and technical realities with the economic and political realities.

Water Quality

The Delta is a source of drinking water for over 23 million Californians, which presents many challenges, particularly in terms of water quality. Salinity and bromide (from saltwater intrusion and agricultural drainage), organic carbon, and pathogens, major constituents of concern for water agencies, are all found in the Delta. Treatment of water containing organic carbon and bromide can create disinfection byproducts that may be harmful to human health. Increasing population adds additional pressures on the Delta system due to greater recreational use and increased wastewater discharges, both of which can impact water quality. Agricultural discharges within the Delta have been shown to contribute a significant part of the organic carbon load in water currently diverted by the export pumps. In addition, some of the proposed CALFED projects for water supply and ecosystem restoration may unintentionally contribute to water quality degradation.

Water quality is also a concern for agricultural and environmental interests. Good water quality is critical for the state's agricultural sector and for the fish and wildlife in the Bay and Delta. The entire Delta is on the SWRCB's 303(d) list2 for sources of mercury, which becomes concentrated in fish tissue. A variety of pesticides and chlorpyrifos are also present in the Delta. South Delta agricultural diverters are often faced with high levels of salinity, which can damage crops and reduce productivity. Low dissolved oxygen in the Stockton Deepwater Ship Channel, also on the 303(d) list, is a long-standing problem that has resulted in harm to aquatic life and may pose a barrier to fall-run salmon migrating upstream to spawn. Dredging to maintain the Stockton and Sacramento deepwater ports may re-suspend contaminants (from sediment) that are toxic to

2 The Clean Water Act requires that states and territories identify impaired and threatened water bodies that are not expected to meet water quality standards, as outlined in Section 303(d) of the Act. These lists result in the development of Total Maximum Daily Loads (TMDLs), which establish the maximum amount of pollutants the water body can receive while still meeting water quality standards.

aquatic life. Vessel discharges of wastes may also contribute to loadings of pathogens and other pollutants.

The CALFED Drinking Water Quality Program is evaluating projects to improve Delta water quality, including relocating agricultural drains and reducing pollutant loads from agricultural drainage. In 2003, this program invested $1.7 million in four drinking water quality projects to monitor and assess organic carbon sources and processes in the Delta. Efforts to model water quality improvements that could be provided by conveyance and storage alternatives are also underway, and monitoring of salinity and dissolved oxygen levels is taking place in several parts of the Delta. Besides the Drinking Water Quality Program, other initiatives are also addressing water quality concerns. The CALFED Ecosystem Restoration Program has invested $10.1 million in six ecosystem restoration projects that include water quality benefits. In addition, the California Bay-Delta Authority and several other agencies are supporting an effort led by the Central Valley Regional Water Quality Control Board to develop a drinking water policy for the Valley Region that will protect the Delta as a drinking water source well into the future.

Ecosystem Restoration

Over the past century, the health of the Delta ecosystem has declined in response to a loss of habitat for both aquatic and terrestrial biota. Remaining habitat quality has also declined due to several factors including water diversions, toxic pollutants, and the introduction of exotic species. In fact, few aquatic ecosystems in North America have been invaded and changed by as many exotic species as those in the Bay-Delta. The Delta no longer provides the broad diversity or quality of habitat necessary to maintain ecological functions and support healthy populations of native plants and animals. Conversion of agricultural land to accommodate ecosystem improvements under the Bay-Delta Program could provide some relief, but these actions are also a major concern for Delta agricultural interests, who rely on the land for their economic survival.

During the past several decades, as water diversions and the recognition of environmental water needs have increased, so have the conflicts among different interests. Water flow and timing requirements have been established for certain fish and wildlife species in response to declining fish and wildlife populations. These requirements restrict the amount of water that can be diverted from the Delta, and constrain the time over which these withdrawals can be made. Over the past decade, a number of other protective actions have been implemented, including the Central Valley Project Improvement Act (CVPIA) and the 1994 Bay-Delta Accord, which have reduced the ability of the CVP and SWP to meet the water demand of their contractors at the times supplies are needed. This timing issue has contributed to the false perception of a zero-sum game, in which ecosystem or water supply interests can only benefit at the other's loss, and has created heightened tension between various groups.

To address ecosystem health issues, the CALFED Ecosystem Restoration Program (ERP) has invested in cooperative projects such as wildlife-friendly agricultural practices, which have shown that different interest groups do not have to compete against each other to prosper in the Delta. Other ecosystem efforts underway include wetlands protection studies, invasive species eradication initiatives, and fish studies to monitor the effects of pesticides on aquatic health. About $155 million has been spent on 107 ecosystem

projects in the Delta, representing one of the largest investments in ecosystem restoration in the United States. The ERP has also funded major studies to examine the effects of pesticides on fish in the Bay-Delta system and the release of dissolved organic carbon and methyl mercury from restored wetlands.

Levee System Integrity

The Delta levees confine flow to channels and protect Delta lands from daily flooding by the tidal fluctuations. Without the levees, the Delta would be a 740,000-acre brackish inland sea. Since the late 1800s, levees have been built from the peat soils native to the Delta. This material is weak and highly compressible, and the use of native peat soils to construct Delta levees has left many of them vulnerable to failure, especially during earthquakes or floods. The high organic content in the soil contributes to rapid decomposition and settling, and decreases the integrity of the levee structures and their ability to hold back water flows. Delta island farmland, residential land and homes, wildlife habitat, and critical infrastructure would be flooded as a result of a levee failure. Flooding in the Delta has historically resulted in millions of dollars of damages. The State formed a partnership with Delta Levee Maintaining Agencies to improve the condition of the extensive Delta levee system. As a result of that partnership, risks have been mitigated to some extent with the implementation in 1986 of a new levee maintenance assistance program, and incidents of levee failure from winter floods have decreased since that time.

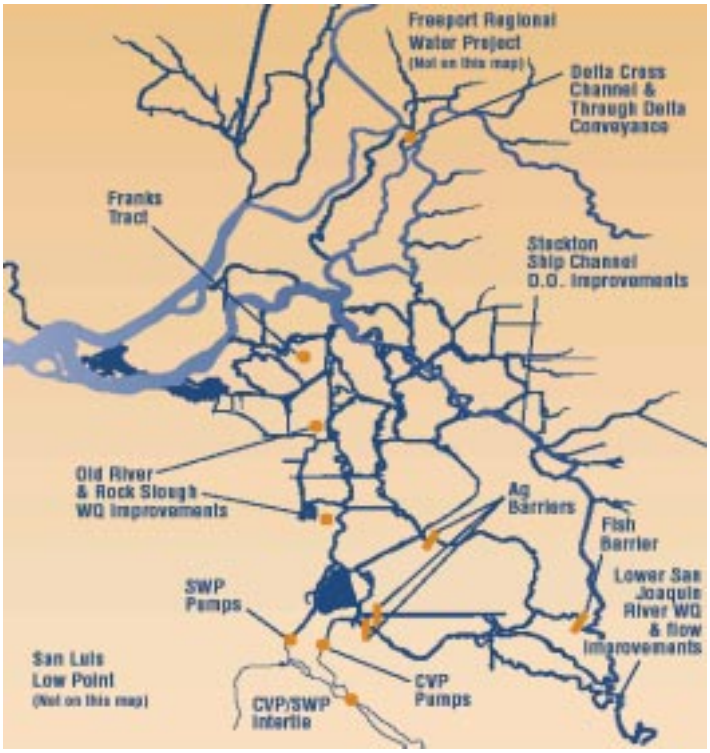
Levee failures during the summer or fall that inundate islands under non-flood conditions can also cause impacts by pulling salty water up into the Delta. The increased salinity in the Delta could shut down CVP and SWP exports from the Delta. The increased salinity in the Delta would be of particular concern in a low water year, when less freshwater is available to flush the salt out of the Delta. This damaging scenario occurred in 1972, when the Brannan-Andrus Island levee failed, resulting in the loss of about 400,000 acre-feet of water supplies and requiring the removal of about 50 tons of salt. Long-term flooding of specific Delta islands could also affect water quality over a longer time horizon by changing the rate of saltwater intrusion and the area of the mixing zone. A long interruption of water supply for in-Delta and export use affecting both urban and agricultural users could result, until the salt water could be flushed from the Delta.

In addition to levee maintenance and enlargement, other levee-related efforts include levee subsidence studies, emergency response coordination (including the distribution of flood fight boxes containing emergency materials such as sandbags and hand tools), analysis of levee risks associated with seismic

events, and dredged material management. The Levee System Integrity efforts have incorporated a number of ecosystem-related projects, such as the habitat development work currently underway at Decker Island, and certain provisions of the Program require that levee activities must result in net habitat improvement. Other agencies involved with the Delta Levee efforts include the U.S. Army Corps of Engineers and the California Department of Fish and Game.

Water Supply Reliability

Since the Delta water users divert directly out of adjacent channels running through the Delta, they normally have immediate access to water. However, water levels in the channels are influenced by CVP and SWP operations, especially diversions at the south Delta export pumps. Lower water levels in the south Delta make it difficult for local irrigators to pump or siphon the water from the channels to their farmlands. Moreover, the flow of water to the export pumps can draw water with a higher salinity into the south Delta from the western Delta.

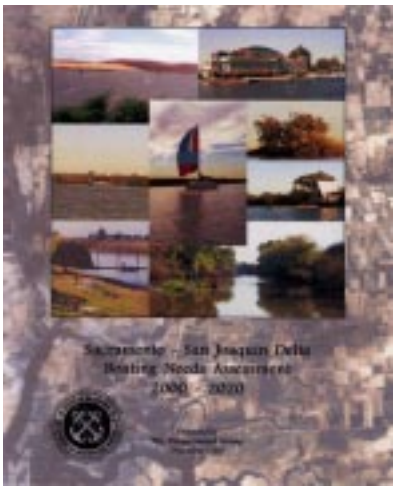


To help address the water level problem, CALFED agencies provide assistance in creating temporary barriers in portions of the Delta to raise water levels for irrigators. Other site-specific actions enable easier water diversions. Longer-term solutions involving the installation of permanent operable barriers are being analyzed as part of the South Delta Improvements Program (SDIP), which would enable increasing pumping operations at Banks Pumping Plant to 8,500 cubic feet per second during longer periods of the year. Design and environmental reviews of the SDIP are progressing. Other water supply activities in the Delta currently under investigation by CALFED include adding an intertie between the CVP and SWP canals, re-operating the Delta Cross-Channel (DCC) for the benefit of fish and water quality, and feasibility studies for an in-Delta storage project. Thus far, modeling studies for the CVP-SWP intertie and two years of research experiments on DCC re-operation have been completed. In addition, a draft report about the engineering feasibility of the in-Delta storage project has been published for review.

Recreation

According to figures used in the 1995 Sacramento-San Joaquin Delta Atlas, the Delta was estimated to support 12 million recreational user days a year. According to surveys conducted in 1996 by the Delta Protection Commission (DPC)and the Department of Parks and Recreation (DPR), 23.5 percent of registered boat owners and 23 percent of

licensed anglers in the State of California participated in recreation activities in the Delta. Fishing, cruising, water skiing, swimming, and sailing are all popular ways of recreating in the Delta, as well as sightseeing and wildlife viewing. Given the growing population trends across the state, and the popularity of the Delta as a major recreational location, recreation use in the Delta is likely to increase along with other services.



The DPC, DPR, and the Department of Boating and Waterways (DBW) are important to Delta recreation. In addition to the 1996 surveys, DBW cooperated with DPC's Recreation Citizen's Advisory Committee in December of 2002 to produce a Boating Needs Assessment, inventorying existing recreational boating infrastructure in the Delta and projecting future boating needs. This assessment followed a 1995 Report conducted by DPC, which made recommendations to improve recreation conditions and access. Funding to prepare a detailed Delta Recreation Master Plan has not materialized yet. However, the studies that have been conducted and the estimates of recreation use in the Delta indicate that recreation is a key component in management of Delta resources. As a public resource and economic benefit, recreation opportunities in the Delta are highly valued.

Looking to the Future

A wide variety of studies and projects are underway to improve water supply reliability and protect water quality, ecosystem health, and the stability of levees in the Delta. Most of these activities are being conducted by state and federal agencies in partnership with local landowners and Delta interests, and many of the major projects are critical to implementing the CALFED Bay-Delta Program Plan.

This year, CALFED implementing agencies are working towards agreement with Delta interests about the *Delta Improvements Package* to move critical projects forward so that CALFED objectives can be achieved. These projects are outlined in the CALFED Bay-Delta Program Record of Decision (ROD), which calls for balanced implementation of CALFED program elements. In the Delta Region, implementation of the CALFED resource management objectives includes: improving the environment so that threatened and endangered species populations can recover; making continual improvements in Delta water quality; increasing conveyance capacity of the Delta pumping plants (to improve water supply reliability statewide); assuring adequate water levels for agricultural diverters; and improving levee system integrity. The Delta Improvements Package is a framework for moving forward in each of these areas simultaneously. For example, although the CALFED ROD did not require that Delta water quality improvements occur before increasing the pumping capacity of Delta pumping plants, DWR and USBR are working with Delta interests to improve salinity levels in the south Delta while proceeding with studies for the South Delta Improvements Program (SDIP).

Following is a summary of major programs and actions that will benefit the Delta Region. These programs are critical to achieving major project milestones established for Stage 1 (years 1 through 7) of the CALFED Bay-Delta Program. Successful completion of these efforts will lay the foundation for sustainable water resource management in the Delta for the next generation.

Water Quality

The Bay-Delta Authority has an integrated water quality program to address a series of water quality issues throughout the Delta and Central Valley. Several individual projects have been identified for implementation as part of the program. The goals and objectives of this program include:

- Continuously improving Delta water quality for all uses
- Addressing all dissolved oxygen and salinity impairments in the Delta
- Addressing other existing water quality impairments that may be affected by proposed actions
- Perform recirculation studies as required by D-1641
- Address habitat and hydraulic issues on Frank's Tract
- Address State and Regional Water Resources Control Board regulatory requirements:
    - Meeting current water quality protection terms and conditions in water right permits
    - Impacts evaluation of proposed actions and development of needed mitigation measures
    - Develop response plans addressing potential impacts from increased diversions caused by Joint Points of Diversion, applications for additional diversions, petitions to add points of diversion or change place of CVP or SWP use, long and short term water transfer petitions, Section 401 water quality certifications, and others as required.

See the appendix for brief descriptions of water quality projects that will help achieve the above goals and objectives.

Ecosystem Restoration

The Delta Regional Ecosystem Restoration Implementation Plan is currently being prepared by the Department of Fish and Game in cooperation with the Bay-Delta Authority. The CALFED ERP Program is committed to developing and refining the regional implementation plan for the Delta. The ERP expects to refine and prioritize actions during the regional planning process, and to vet the scientific foundation for actions and milestones. Regional plans for most of the Delta Region and part of the Suisun Marsh (in the Bay Region) are underway. The Delta Protection Commission provides guidance and input to this planning process.

The DPC has also partnered with the American Farmland Trust to prepare an inventory of Delta agriculture resources and their economic value. This inventory will help identify lands that should receive additional attention and/or protection. The resulting DPC plan could help in the

Ongoing Planning Efforts

- American Farmland Trust study of Delta agriculture.
- DFG Ecosystem Restoration Plan for the Delta.
- SAFCA study of new flood control projects for Sac and West Sac in Yolo Bypass.
- Yolo Flyway Center --proposed public education facility adjacent to Yolo Bypass.
- Delta Science Center--proposed public education facility at Big Break Regional Shoreline (East Bay Regional Park District).
- Rio Vista--proposed public education and recreation facility at former military property recently transferred to City of Rio Vista.
- New Research Facility proposed by CALFED Science Consortium at former military property recently transferred to City of Rio Vista.
- Delta Protection Commission proposed study of Delta recreation
- California Bay-Delta Authority, various investigations for implementation of the Bay-Delta Plan

implementation of the CALFED ecosystem restoration goal of protecting and enhancing 45,000-75,000 acres of wildlife friendly agriculture in the Delta.

Water Supply Reliability

The North Delta Improvement Program (NDIP) will provide ecosystem and flood control improvements. The stated purpose of the NDIP is to implement flood control improvements in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. To improve the conveyance facilities in the north Delta for water quality and fishery improvements without incurring water supply disruptions, DWR and USBR, in cooperation with the CALFED Science Program, will continue to conduct studies and experiments to provide a solid basis for future possible Delta Cross Channel (DCC) re-operations. Simultaneously, DWR is refining concepts for a *Through-Delta Facility* to improve water quality conditions in the South Delta without impacting fish by transporting 4,000 cfs of water from the Mokelumne River to the South Delta.

The South Delta Improvements Program (SDIP) is being carried out by DWR and USBR. Actions contemplated as part of the SDIP include providing for more reliable long-term export capability for the SWP and CVP, protection of local diversions, and reducing impacts on San Joaquin River salmon. Increasing SWP pumping at Banks Pumping Plant to 8,500 cubic feet per second and installing permanent, operable barriers in the south Delta will improve water supply reliability for the SWP, CVP, and local agricultural diversions in the Delta.

DWR and USBR are also investigating the In-Delta Storage Project as part of the Bay-Delta Program. Two Delta islands would be modified to store a total of about 217,000 acre-feet for a wide variety of potential uses, including exports and Delta outflow.

Levee System Integrity

[Editor’s note: levee system update being developed]

Recreation

For Delta recreation, DPC has coordinated an Ad Hoc Recreational Committee of agencies and interested parties/stakeholders to develop a recreation vision and plan to be incorporated into the Bay-Delta Program.

Sources of Information

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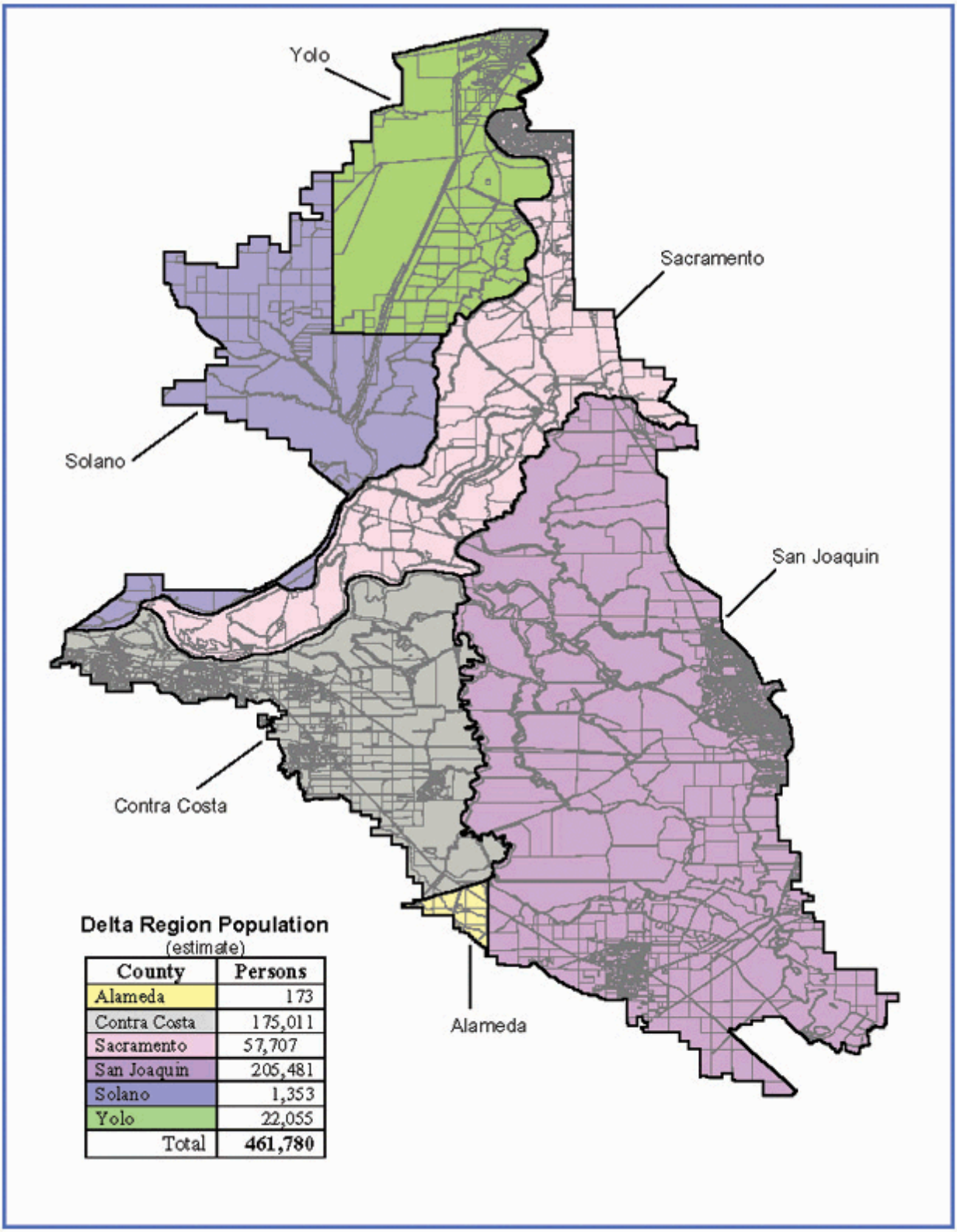
Figure 12-1
Delta Region Population



Delta Region Population
(estimate)

County	Persons
Alameda	173
Contra Costa	175,011
Sacramento	57,707
San Joaquin	205,481
Solano	1,353
Yolo	22,055
Total	**461,780**

Figure 12-2
Delta Water Balance

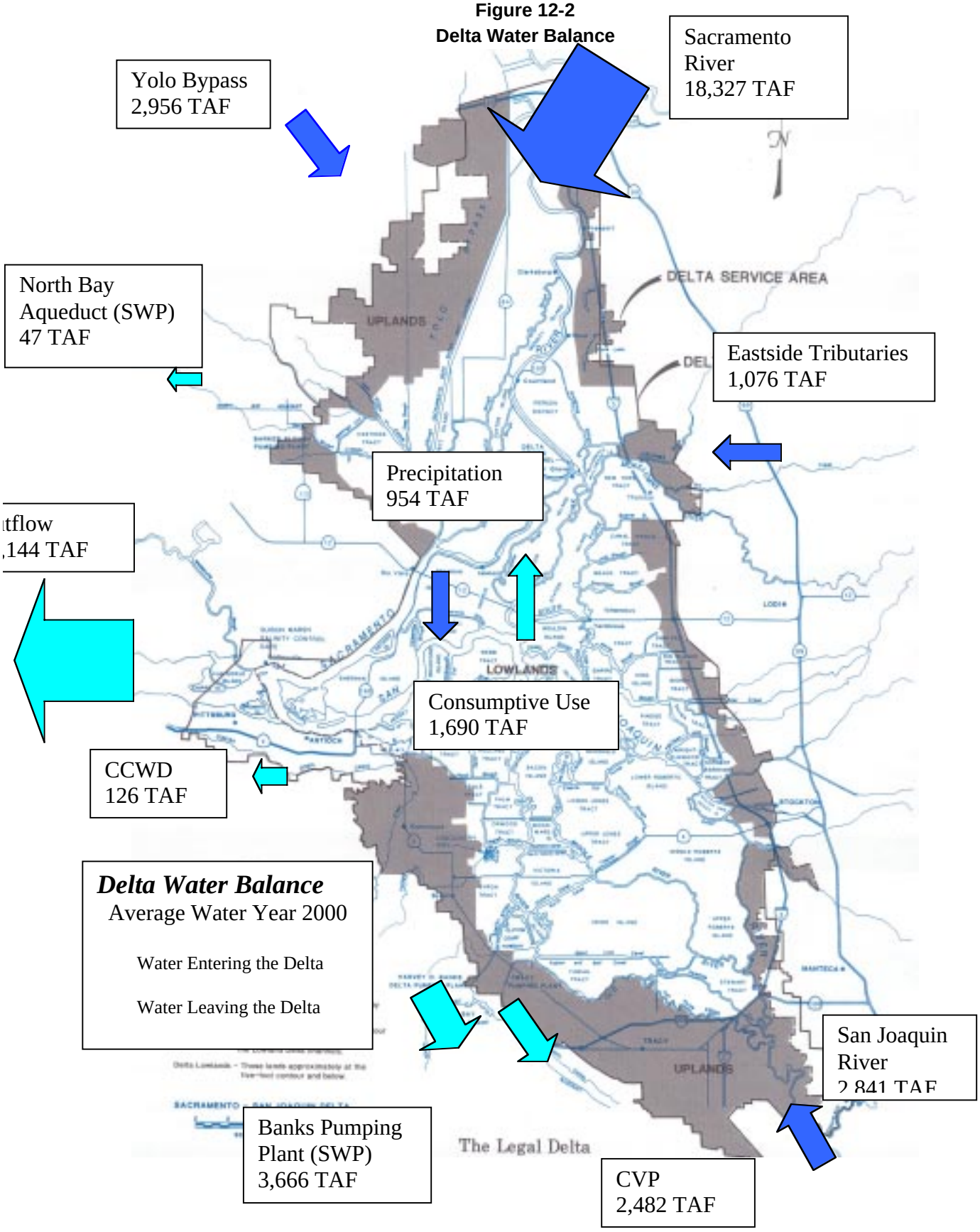


Table 12-1
Water Balance for the Delta Region (IEP Dayflow Data)

Table 1. Water Balance for the Delta Region (IEP Dayflow Data)			
	1,000s of Acre Feet		
	1998 (wet)	2000 (average)	2001 (dry)
Water Entering the Region			
Precipitation	1,421	954	762
Sacramento River	28,964	18,327	10,499
Yolo Bypass (incl. Sac. Weir spill and South Putah Cr.)	8,980	2,956	366
San Joaquin River	8,441	2,841	1,729
Cosumnes River	785	372	116
Mokelumne River	969	360	127
Misc. Eastside Tribs.	339	344	128
Total	49,899	26,155	13,727
Water Leaving the Region			
Consumptive Use (Gross Channel Depletion for Ag, M&I, Wetlands, ET)	1,688	1,690	1,688
SWP Exports			
Banks Pumping Plant	2,111	3,666	2,599
North Bay Aqueduct	39	47	45
CVP Exports	2,470	2,482	2,328
Contra Costa WD Exports	160	126	104
Outflow to Bay/Ocean	43,430	18,144	6,963
Total	49,899	26,155	13,727